

## Division of Polynomials

### Dividing a polynomial by a monomial

Divide each term in the polynomial by the monomial

$$\frac{a+b}{c} = \frac{a}{c} + \frac{b}{c} \text{ where } c \neq 0$$

### Examples:

$$12x^3 + 8x^2 + x + 4 \text{ by } 4x$$

$$(8x^4y^5 - 3x^3y^4 + 5x^2y^3) \div (-x^2y^3)$$

**To divide a polynomial by a polynomial other than a monomial use long division.**

Remember the steps:

D      divide  
M      multiply  
S      subtract  
B      bring down

$$2x^2 - 7x - 15 \text{ by } x - 5$$

$$x^2 + 5x + 8 \text{ by } x + 3$$

$$(9a^2 + a^3 - 5) \div (a^2 - 1)$$

Let  $f(x) = 125x^3 - 8$  and  $g(x) = 5x - 2$ .

If  $F(x) = (f / g)(x)$ ,

Find a simplified expression for  $F(x)$  and list all restrictions on the domain.

**Formulas, Applications, and Variation**

Objectives: formulas, direct variation, inverse variation, joint variation and combined variation

Formulas occur frequently as mathematical models. Many contain rational expressions and to solve such formulas for a specified letter, you must proceed as when solving rational expressions.

**To solve a rational equation for a specified variable**

Multiply both sides by the LCD to clear fractions, if necessary.

Multiply to remove parentheses, if necessary

Get all terms with the specified variable alone on one side

Factor out the specified variable if it is in more than one term

Multiply or divide on both sides to isolate the specified variable.

**Examples:**

$$\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2} \quad \text{Solve for } r_1$$

$$\frac{V^2}{R^2} = \frac{2g}{R+h} \quad \text{Solve for } h$$

$$f = \frac{sg}{s+v} \quad \text{Solve for } s$$

$$s = \frac{(v_1 + v_2)t}{2} \quad \text{Solve for } t$$